

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose This best management practice (BMP) involves developing, for every project, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment controls measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Appropriate Applications Construction sequencing shall be scheduled to minimize land disturbance for all projects during the rainy season.

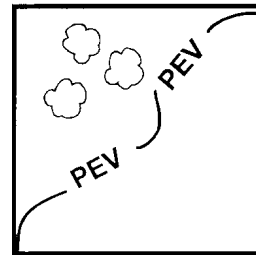
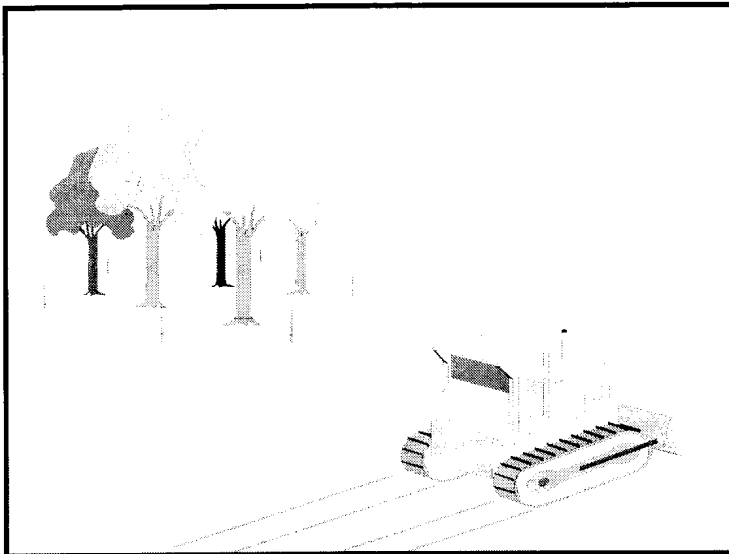
Limitations None identified.

- Standards and Specifications**
- Plan the project and develop a schedule or to layout the construction plan. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The construction schedule shall be incorporated into the SWPPP or WPCP.
 - The schedule shall include detail on the rainy season implementation and deployment of:
 - temporary soil stabilization BMPs,
 - temporary sediment control BMPs,
 - tracking control BMPs,
 - wind erosion control BMPs,
 - non-storm water BMPs, and

- waste management and materials pollution control BMPs.
- • Schedule shall also include dates for significant long-term operations or activities that may have planned non-storm water discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, bridge cleaning, etc.
- • Schedule work to minimize soil disturbing activities during the rainy season.
- • Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season.
- • Schedule major grading operations for the non-rainy season when practical.
- • Stabilize non-active areas as soon as practical.
- • Monitor the weather forecast for rainfall.
- • When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
- • Be prepared year-round to deploy soil stabilization and sediment control and sediment treatment control practices as required by Section 2 of this Manual. Erosion may be caused during dry seasons by unseasonal rainfall, wind and vehicle tracking. Keep the site stabilized year-round, and retain and maintain rainy season sediment trapping devices in operational condition.
- • Sequence trenching activities so that most open portions are closed before new trenching begins.
- • Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
- • Consider scheduling when establishing permanent vegetation (appropriate planting time for specified vegetation).
- • Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Maintenance and Inspection

- • Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- • Amend the schedule when changes are warranted or when directed by the Resident Engineer (RE).
- • The Special Provisions require annual submittal of rainy season implementation schedule. Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.



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Definition and Purpose Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.

- Appropriate Applications**
- • Preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date.
 - • On a year-round basis, temporary fencing shall be provided prior to clearing and grubbing operations or other soil-disturbing activities in areas where no construction activity is planned or will occur at a later date.
 - • No grading or disturbances shall occur in areas identified on the plans to be preserved, especially on areas designated as Environmentally Sensitive Areas (ESAs).

Limitations Protection of existing vegetation requires planning, and may limit the area available for construction activities.

- Standards and Specifications** *Timing*
- • Preservation of existing vegetation shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities in areas where no construction activity is planned or will occur at a later date.
 - • Preservation of existing vegetation shall conform to scheduling requirements set forth in the special provisions.

Design and Layout

- • Mark areas to be preserved with temporary fencing made of orange polypropylene that is stabilized against ultraviolet light. The temporary fencing shall be at least one meter wide and shall have openings not larger than 50mm by 50mm.
- • Fence posts shall be either wood or metal, at the Contractor's discretion, as appropriate for the intended purpose. The post spacing and depth shall be adequate to completely support the fence in an upright position.
- • Minimize the disturbed areas by locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling.
- • Consider the impact of grade changes to existing vegetation and the root zone.

Installation

- • Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.
- • Keep equipment away from trees to prevent trunk and root damage.
- • Maintain existing irrigation systems.
- • Employees and subcontractors shall be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials shall be permitted within the drip line of any tree to be retained. Removed trees shall not be felled, pushed, or pulled into any retained trees. Fires shall not be permitted within 30 m (100 ft) of the drip line of any retained trees. Any fires shall be of limited size, and shall be kept under continual surveillance. No toxic or construction materials - including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants - shall be stored within 15 m (50 ft) of the drip line of any retained trees, nor disposed of in any way which would injure vegetation.

Trenching and Tunneling

- • Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching and/or tunneling near or under trees to be retained, tunnels shall be at least 450 mm (18 in) below the ground surface, and not below the tree center to minimize impact on the roots.

- • Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.
- • The ends of damaged or cut roots shall be cut off smoothly.
- • Trenches and tunnels shall be filled as soon as possible. Careful filling and tamping will eliminate air spaces in the soil which can damage roots.
- • Remove any trees intended for retention if those trees are damaged seriously enough to affect their survival. If replacement is desired or required, the new tree shall be of similar species, and of at least 50 mm (2 in) caliper, unless otherwise required by the contract documents.
- • After all other work is complete, fences and barriers shall be removed last. This is because protected trees may be destroyed by carelessness during the final cleanup and landscaping.

Maintenance and Inspection During construction, the limits of disturbance shall remain clearly marked at all times. Irrigation or maintenance of existing vegetation shall conform to the requirements in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below shall be followed:

- • Serious tree injuries shall be attended to by an arborist.
- • Any damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- • Damaged roots shall be immediately cut clean.
- • If bark damage occurs, all loosened bark shall be cut back into the undamaged area, with the cut tapered at the top and bottom, and drainage provided at the base of the wood. Cutting of the undamaged area shall be as limited as possible.
- • Soil which has been compacted over a tree's root zone shall be aerated by punching holes 300 mm (12 in) deep with an iron bar, and moving the bar back and forth until the soil is loosened. Holes shall be placed 450 mm (18 in) apart throughout the area of compacted soil under the tree crown.
- • Stressed or damaged broadleaf trees shall be fertilized to aid recovery.
- • Trees shall be fertilized in the late fall or early spring.
- • Fertilizer shall be applied to the soil over the feeder roots and in accordance with label instructions, but never closer than 1 m (3 ft) to the trunk. The

Preservation of Existing Vegetation

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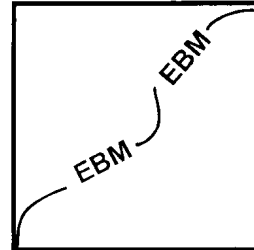
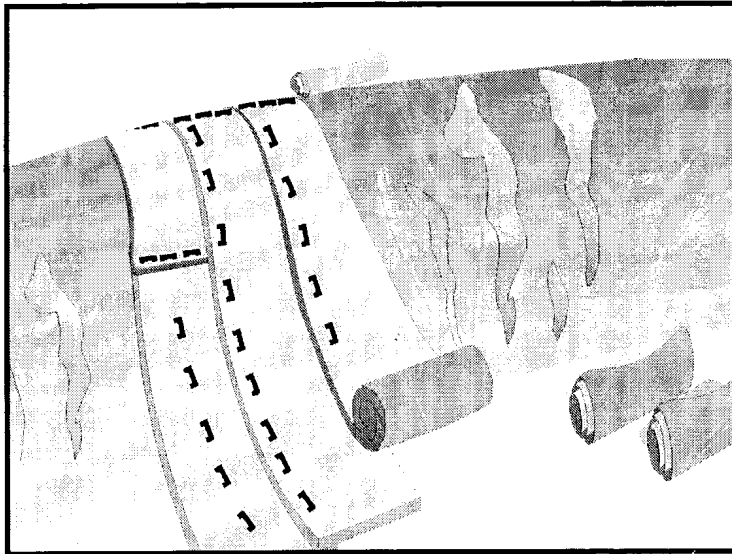
fertilized area shall be increased by one-fourth of the crown area for conifers that have extended root systems.

- • During construction, District Environmental shall be contacted to ensure that ESAs are protected.



Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose This Best Management Practice (BMP) involves the placement of geotextiles, plastic covers, or erosion control blankets/mats to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 1:3 (V:H).
- Slopes where the erosion hazard is high.
- Slopes and disturbed soils where mulch must be anchored
- Disturbed areas where plants are slow to develop adequate protective cover.
- Channels with flows exceeding 1.0 m/s (3.3 ft/s).
- Channels intended to be vegetated.
- Sockpiles
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs).

Limitations • Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.



Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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- Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Plastic results in 100 percent runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic shall be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.

Standards and Specifications

Material Selection

There are many types of erosion control blankets and mats, and selection of the appropriate type should be based on the specific type of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer (RE). The following criteria shall be considered in selection of the appropriate material:

- Cost
 - Material cost
 - Preparation cost
 - Installation cost
 - Add-ons
- Effectiveness
 - Reduction of erosion
 - Reduction of flow velocity
 - Reduction of runoff
- Acceptability
 - Environmental compatibility
 - Institutional/regulatory acceptability
 - Visual impact



Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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- • Vegetation Enhancement
 - Native plant compatibility
 - Moisture retention
 - Temperature modification
 - Open space/coverage
- • Installation
 - Durability
 - Longevity
 - Ease of installation
 - Safety
- • Operation and Maintenance
 - Maintenance frequency

Geotextiles

- • Material shall be a woven polypropylene fabric with minimum thickness of 15 mm, minimum width of 3.7 m and shall have minimum tensile strength of 0.67 kN (warp) 0.36 kN (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under Geotextile.
- • Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.

Plastic Covers

- • Temporary soil stabilization (Type plastic cover) material shall be polyethylene sheeting and shall have a minimum thickness of 6 mils. Plastic covers shall be anchored by sandbags placed no more than 3 m (10 ft) apart and by keying into the tops of slopes to prevent infiltration of surface waters under the plastic. All seams shall be taped or weighted down their entire length, and there shall be at least a 300 mm (12 in) to 600 mm (24 in) overlap of all seams.
- • Plastic covers may be reused if, in the opinion of the RE, they are suitable for the use intended.



Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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Erosion Control Blankets/Mats

- Erosion control blankets/mats shall be either straw, coconut, straw/coconut or Excelsior blanket, in accordance with the project Special Provisions, SSP 07-390.

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 50 mm (2 in) to 75 mm (3 in) of topsoil.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 3.05 mm steel wire and shall be U-shaped with 200-mm legs and 50-mm crown. Wire staples shall be minimum of 11 gauge.
- Metal stake pins shall be 5 mm (0.188 in) diameter steel with a 40 mm (1.5 in) steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall be 150 mm (6 in) to 450 mm (18 in) long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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Installation on Slopes

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 150 mm (6 in) deep by 150 mm (6 in) wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket downslope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 50 mm (2 in) to 75 mm (3 in) and staple every 1 m (3 ft).
- When blankets must be spliced, place blankets end over end (shingle style) with 150 mm (6 in) overlap. Staple through overlapped area, approximately 300 mm (12 in) apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/m² (2 staples/yd²). Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1½ staples/m² (1 ½ staples/yd²), placing 1 staple/m (1 staple/yd) on centers. Gentle slopes require a minimum of 1 staple/m² (1 staple/yd²).

Installation in Channels

Always consult the manufacturer's recommendations for installation. In general, these will be as follows:

- Dig initial anchor trench 300 mm (12 in) deep and 150 mm (6 in) wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 150 mm (6 in) deep and 150 mm (6 in) wide across the channel at 8 m to 10 m (25 ft to 30 ft) intervals along the channels.
- Cut longitudinal channel anchor slots 100 mm (4 in) deep and 100 mm (4 in) wide along each side of the installation to bury edges of matting, whenever possible extend matting 50 mm (2 in) to 75 mm (3 in) above the crest of the channel side slopes.



Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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- • Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 300 mm (12 in) intervals. Note: matting will initially be upside down in anchor trench.
- • In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 75 mm (3 in).
- • Secure these initial ends of mats with anchors at 300 mm (12 in) intervals, backfill and compact soil.
- • Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 75 mm (3 in) overlap.
- • Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 300 mm (12 in) intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- • Alternate method for non-critical installations: Place two rows of anchors on 150 mm (6 in) centers at 8 m (25 ft) to 10 m (30 ft) intervals in lieu of excavated check slots.
- • Shingle-lap spliced ends by a minimum of 300 mm (12 in) apart on 300 mm (12 in) intervals.
- • Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.
- • Anchor, fill and compact upstream end of mat in a 300 mm (12 in) by 150 mm (6 in) terminal trench.
- • Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- • Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

- • Always consult the manufacturer's recommendations for installation.
- • Do not drive tracked or heavy equipment over mat.



Geotextiles, Plastic Covers and Erosion Control Blankets/Mats

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- • Avoid any traffic over matting if loose or wet soil conditions exist.
- • Use shovels, rakes or brooms for fine grading and touch up.
- • Smooth out soil filling; just exposing top netting of mat.

Temporary Soil Stabilization Removal

- • When no longer required for the work, temporary soil stabilization shall become the property of the Contractor. Temporary soil stabilization removed from the site of the work shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Maintenance and Inspection

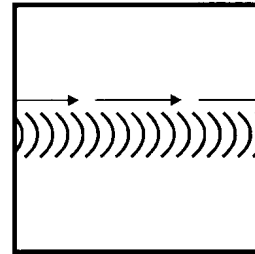
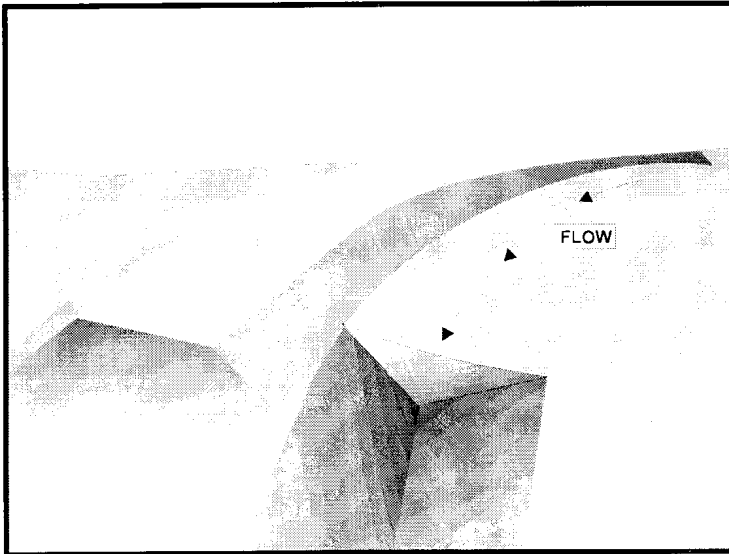
Areas treated with temporary soil stabilization shall be inspected as specified in the special provisions. Areas treated with temporary soil stabilization shall be maintained to provide adequate erosion control. Temporary soil stabilization shall be reapplied or replaced on exposed soils when greater than 10 percent of the previously treated area becomes exposed or exhibits visible erosion.

- • All blankets and mats shall be inspected periodically after installation.
- • Installation shall be inspected after significant rain storms to check for erosion and undermining. Any failures shall be repaired immediately.
- • If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.



Earth Dikes/Drainage Swales and Lined Ditches

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Definition and Purpose These are structures that intercept, divert and convey surface run-on, generally sheet flow, to prevent erosion.

Appropriate Applications

- • Earth dikes/drainage swales and lined ditches may be used to:
 - Convey surface runoff down sloping land
 - Intercept and divert runoff to avoid sheet flow over sloped surfaces
 - Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
 - To intercept runoff from paved surfaces.
- • Earth dikes/drainage swales and lined ditches also may be used:
 - Below steep grades where runoff begins to concentrate
 - Along roadways and facility improvements subject to flood drainage.
 - At the top of slopes to divert run-on from adjacent or undisturbed slopes.
 - At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- • This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).



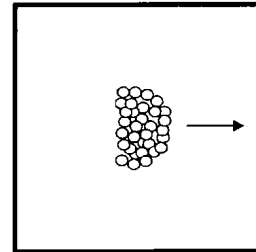
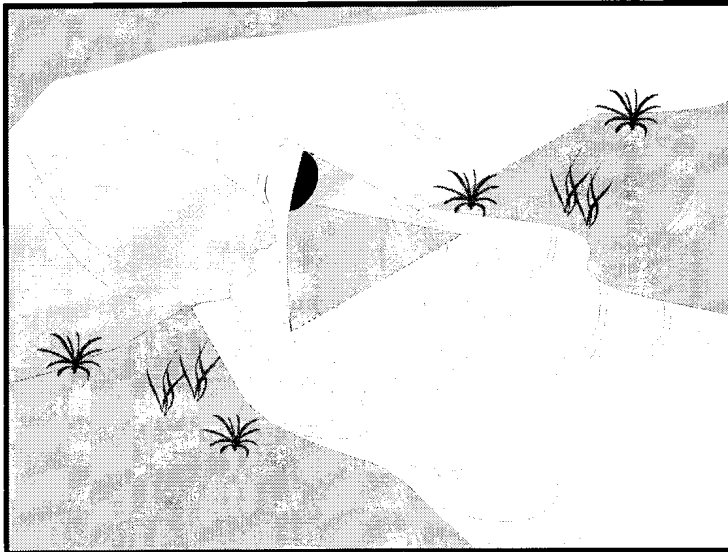
Earth Dikes/Drainage Swales and Lined Ditches

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Limitations	<ul style="list-style-type: none">• • Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.• • May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.
Standards and Specifications	<ul style="list-style-type: none">• • Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.• • Conveyances shall be stabilized.• • Use a lined ditch for high flow velocities.• • Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, over topping, flow backups, washout, and drainage flow patterns for each project site.• • Compact any fills to prevent unequal settlement.• • Do not divert runoff from the Highway right-of-way onto other property.• • When possible, install and utilize permanent dikes, swales and ditches early in the construction process.• • Provide stabilized outlets.
Maintenance and Inspections	<ul style="list-style-type: none">• • Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.• • Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.• • Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed or as directed by the Engineer.• • Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Outlet Protection/Velocity Dissipation Devices

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BMP Objectives

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- Sediment Control
- Tracking Control
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- Non-Storm Water Management
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Definition and Purpose These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of exiting storm water flows.

Appropriate Applications

- These devices may be used at the following locations:
 - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels.
 - Outlets located at the bottom of mild to steep slopes.
 - Discharge outlets that carry continuous flows of water.
 - Outlets subject to short, intense flows of water, such as flash floods.
 - Points where lined conveyances discharge to unlined conveyances.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Loose rock may have stones washed away during high flows.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.



Outlet Protection/Velocity Dissipation Devices

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Standards and Specifications

- • There are many types of energy dissipater's, with rock being the one that is represented in the attached figure. Please note that this is only one example and the Resident Engineer (RE) may approve any other type of device proposed by the contractor.
- • Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction.
- • Carefully place riprap to avoid damaging the filter fabric.
- • For proper operation of apron:
 - Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
 - If size of apron riprap is large, protect underlying filter fabric with a gravel blanket
- • Outlets on slopes steeper than 10 percent shall have additional protection.

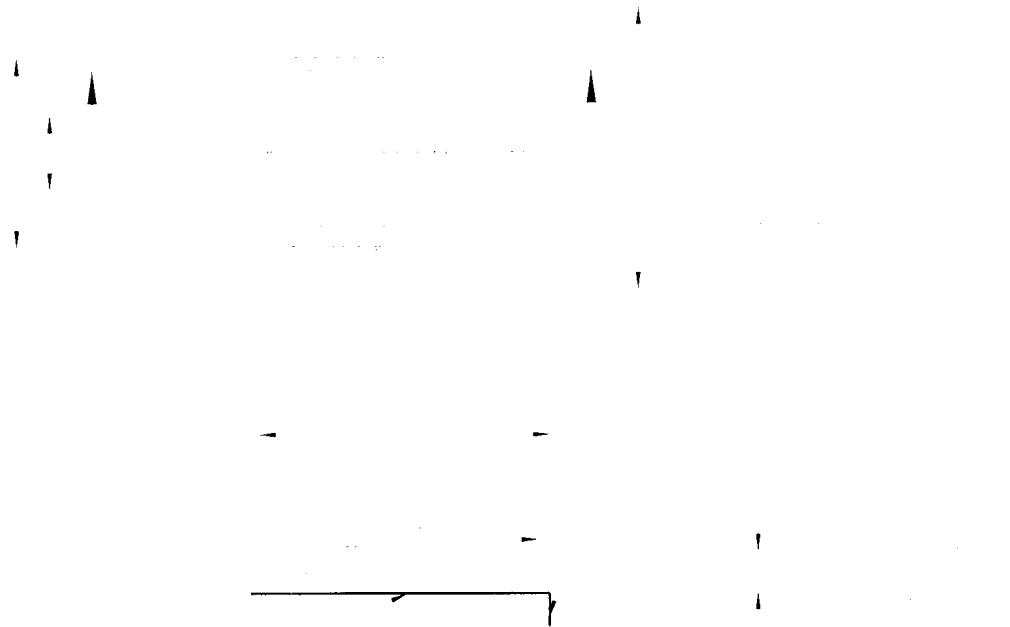
Maintenance and Inspection

- • Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- • Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap which has washed away.
- • Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- • Temporary devices shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.



Outlet Protection/Velocity Dissipation Devices

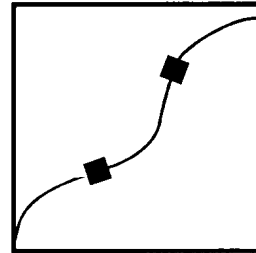
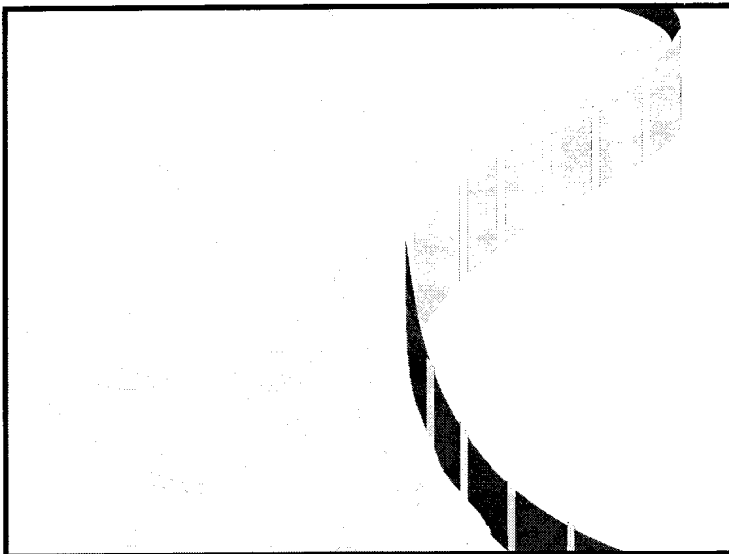
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Pipe Diameter mm	Discharge m ³ /s	Apron Length, La m	Rip Rap D ₅₀ Diameter Min mm
300	0.14	3	100
	0.28	4	150
450	0.28	3	150
	0.57	5	200
	0.85	7	300
	1.13	8	400
600	0.85	5	200
	1.13	8	200
	1.42	8	300
	1.70	9	400
For larger or higher flows, consult a Registered Civil Engineer			

Source: USDA – SCS





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Definition and Purpose A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications Silt fences are placed:

- Below the toe of exposed and erodible slopes.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along streams and channels.

Limitations

- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 1:4 (V:H)
- Must be maintained.
- Must be removed and disposed of.

Standards and Specifications *General*

- Don't use below slopes subject to creep, slumping, or landslides.
- Don't use in streams, channels, or anywhere flow is concentrated.
- Don't use silt fences to divert flow.

Design and Layout

- • The maximum length of slope draining to any point along the silt fence shall be 61 m (200 ft) or less.
- • Slope of area draining to fence shall be less than 1:1 (V:H).
- • Limit to locations suitable for temporary ponding or deposition of sediment.
- • Fabric life span generally limited to between five and eight months. Longer periods may require fabric replacement.
- • Silt fences shall not be used in concentrated flow areas.
- • Lay out in accordance with Page 5 of this BMP.
- • For slopes steeper than 1:2 (V:H) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- • For slopes adjacent to water bodies or Environmentally Sensitive Areas (ESAs), additional temporary soil stabilization BMPs shall be used.

Materials

- • Silt fence fabric shall be woven polypropylene with a minimum width of 900 mm and a minimum tensile strength of 0.45-kN. The fabric shall conform to the requirements in ASTM designation D4632 and shall have an integral reinforcement layer. The reinforcement layer shall be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric shall be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491.
- • Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- • Staples used to fasten the fence fabric to the stakes shall be not less than 45 mm long and shall be fabricated from 1.57 mm or heavier wire. The wire used to fasten the tops of the stakes together when joining 2 sections of fence shall be 3.05 mm or heavier wire. Galvanizing of the fastening wire will not be required.

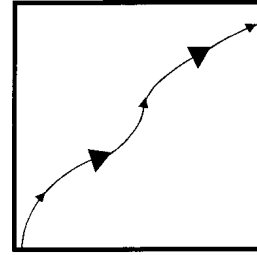
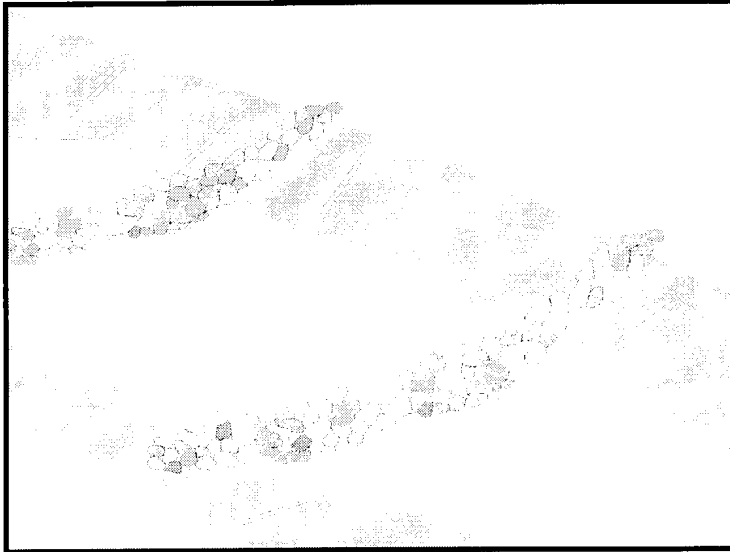
Installation

- • Generally, silt fences shall be used in conjunction with soil stabilization source controls up slope to provide effective control.
- • Trenches shall not be excavated wider and deeper than necessary for proper installation of the temporary linear sediment barriers.
- • Excavation of the trenches shall be performed immediately before installation of the temporary linear sediment barriers.
- • Construct silt fences with a set-back of at least 1m from the toe of a slope. Where a silt fence is determined to be not practicable due to specific site conditions, the silt fence may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.
- • Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case shall the reach exceed 150 meters.
- • Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
- • Bottom of the silt fence shall be keyed-in.
- • Install in accordance with Page 5 of this BMP.

Maintenance and Inspection

- • Repair undercut silt fences.
- • Repair or replace split, torn, slumping, or weathered fabric.
- • Inspect silt fence when rain is forecast. Perform necessary maintenance, or maintenance required by the Resident Engineer (RE).
- • Inspect silt fence following rainfall events. Perform maintenance as necessary, or as required by the RE.
- • Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third (1/3) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- • Silt fences that are damaged and become unsuitable for the intended purpose, as determined by the RE, shall be removed from the site of work, disposed of outside the highway right-of-way in conformance with the Standard Specifications, and replaced with new silt fence barriers.

- • Holes, depressions or other ground disturbance caused by the removal of the temporary silt fences shall be backfilled and repaired in conformance with the Standard Specifications.
- • Remove silt fence when no longer needed or as required by the RE. Fill and compact post holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A check dam is a small device constructed of rock, sandbags, or fiber rolls, placed across a natural or man-made channel or drainage ditch. Check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment dropout.

Appropriate Applications

- • Check dams may be installed in the following:
 - In small open channels which drain 4 ha (10 ac) or less.
 - In steep channels where storm water runoff velocities exceed 1.5 meters per second (m/s).
 - During the establishment of grass linings in drainage ditches or channels.
 - In temporary ditches where a short length of service does not warrant establishment of erosion-resistant linings.
- • This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

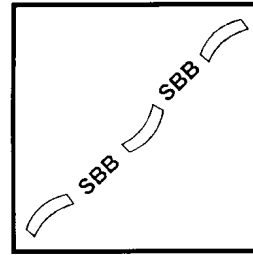
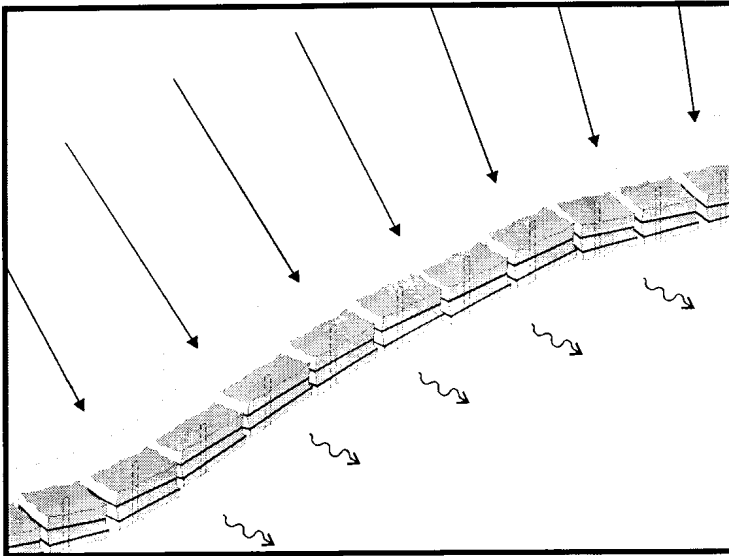
- • Not to be used in live streams.
- • Not appropriate in channels which drain areas greater than 4 ha (10 ac).
- • Not to be placed in channels which are already grass lined unless erosion is expected, as installation may damage vegetation.
- • Require extensive maintenance following high velocity flows.

Standards and Specifications

- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Not to be constructed from straw bales or a silt fence.
- Check dams shall be placed at a distance and height to allow small pools to form behind them.
- Install the first check dam approximately five meters (5 m) from the outfall device and at regular intervals based on slope gradient and soil type.
- For multiple check dam installation, backwater from downstream check dam shall reach the toe of the upstream dam.
- High flows (typically a 2-year storm or larger) shall safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams shall be removed when grass has matured sufficiently to protect the ditch or swale.
- Rock shall be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.

Maintenance and Inspection

- Inspect check dams after each significant rainfall event. Repair damage as needed or as required by the RE.
- Remove sediments when depth reaches one-third of the check dam height.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed or when required by the RE.
- Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A straw bale barrier is a temporary linear sediment barrier consisting of straw bales, designed to intercept and slow sediment-laden sheet flow runoff. Straw bale barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across minor swales or ditches with small catchments.
- Around above grade type temporary concrete washouts (See BMP WM-8, "Concrete Waste Management").
- Parallel to a roadway to keep sediment off paved areas.
- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).

- Limitations
- Don't use in areas subjected to highly concentrated flows, such as channels or live streams.
 - Installation can be labor intensive.
 - Straw bale barriers are maintenance intensive.
 - Degraded straw bales may fall apart when removed or left in place for extended periods.
 - Can't be used on paved surfaces.
 - Not to be used for drain inlet protection.
 - Shall not be used on lined ditches.

Standards and Specifications *Materials*

- **Straw Bale Material:** Straw bale materials shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications.
- **Straw Bale Size:** Each straw bale shall be a minimum of 360 mm (14 in) wide, 450 mm (18 in) in height, 900 mm (36 in) in length and shall have a minimum mass of 23 kg (51 lb.) The straw bale shall be composed entirely of vegetative matter, except for the binding material.
- **Bale Bindings:** Bales shall be bound by either steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding shall not be used. Baling wire shall be a minimum diameter of 1.57 mm. Nylon or polypropylene string shall be approximately 2 mm in diameter with a breaking strength of 360 N.
- **Stakes:** Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

Installation

- Limit the drainage area upstream of the barrier to 0.3 ha/100 m (0.25ac/100ft) or barrier.
- Limit the slope length draining to the straw bale barrier to 30 m (100 ft.)
- Slopes of 2:100 (V:H)(2%) or flatter are preferred. If the slope exceeds 1:10 (V:H) (10%), the length of slope upstream of the barrier must be less than 15 m (50 ft).

Straw Bale Barrier

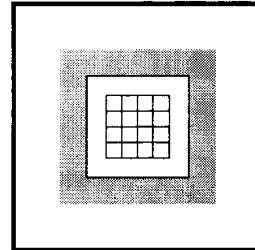
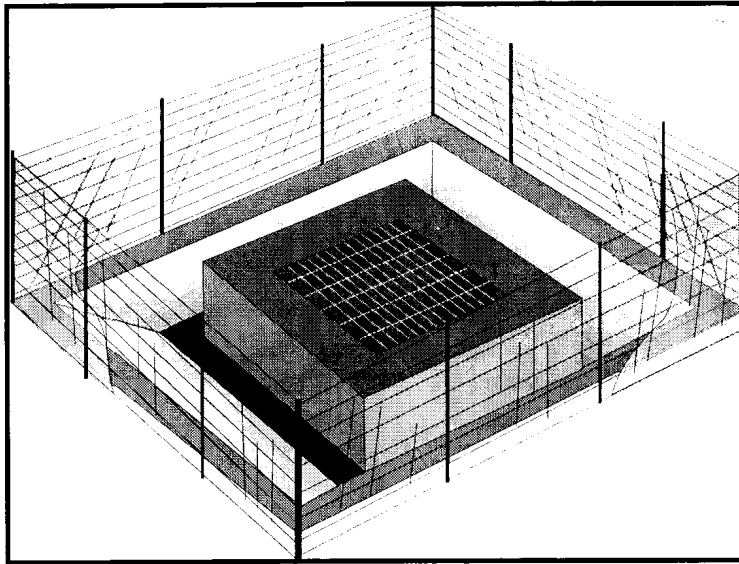
SC-9

- • Install straw bale barriers along a level contour, with the last straw bale turned up slope.
- • Straw bales must be installed in a trench and tightly abut adjacent bales.
- • Construct straw bale barriers with a set-back of at least 1m from the toe of a slope. Where it is determined to be not practicable due to specific site conditions, the straw bale barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.
- • See page 4 of this BMP for installation detail.

Maintenance and Inspection

- • Inspect straw bale barriers before and after each rainfall event, and weekly throughout the rainy season.
- • Inspect straw bale barriers for sediment accumulations and remove sediments when depth reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- • Replace or repair damage bales as needed or as directed by the RE.
- • Repair washouts or other damages as needed or as directed by the RE.
- • Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.





BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Devices used at storm drain inlets that are subject to runoff from construction activities to detain and/or to filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge of storm water into storm water drainage systems or watercourses.

Appropriate Applications

- • Where ponding will not encroach into highway traffic.
- • Where sediment laden surface runoff may enter an inlet.
- • Where disturbed drainage areas have not yet been permanently stabilized.
- • Where the drainage area is 0.4 ha (1 ac) or less.
- • Appropriate during wet and snow-melt seasons.

Limitations

- • Use only when ponding will not encroach into highway traffic or onto erodible surfaces and slopes. If safety is a concern, use other methods of temporary protection to prevent sediment-laden storm water and non-storm water discharges to enter the storm drain system.
- • Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques in conjunction with inlet protection.
- • Frequent maintenance is required.
- • For drainage areas larger than 0.4 ha (1ac), runoff shall be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, "Desilting Basin", and SC-3 "Sediment Traps".

- • Filter fabric fence inlet protection appropriate in open areas is subject to sheet flow and for flows not exceeding $0.014 \text{ m}^3/\text{s}$ (0.5 cfs).
- • Sandbag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed $0.014 \text{ m}^3/\text{s}$ (0.5 cfs), and it is necessary to allow for overtopping to prevent flooding.
- • Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

Standards and Specifications Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

Methods and Installation

- • ***DI Protection Type 1 - Filter Fabric Fence*** - The filter fabric fence (Type 1) protection is illustrated in Page 4. Similar to constructing a silt fence. See BMP SC-1, "Silt Fence". Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- • ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap*** - The excavated drop inlet sediment trap (Type 2) is illustrated in Page 5. Similar to constructing a temporary silt fence, See BMP SC-1, "Silt Fence". Size excavated trap to provide a minimum storage capacity calculated at the rate of $130 \text{ m}^3/\text{ha}$ ($67 \text{ yd}^3/\text{ac}$) of drainage area.
- • ***DI Protection Type 3 - Sandbag Barrier*** - The sandbag barrier (Type 3) is illustrated in Page 6. Flow from a severe storm shall not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct sandbags in accordance with BMP SC-8, "Sandbag Barrier".

Maintenance and Inspection ***General***

- • Inspect all inlet protection devices before and after every rainfall event, and weekly during the rest of the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.
- • Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
- • Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.

- Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
- Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

Requirements by Method

• • Type 1 - Filter Fabric Fence

- Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
- Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the Resident Engineer (RE).
- At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

• • Type 2 - Excavated Drop Inlet Sediment Trap

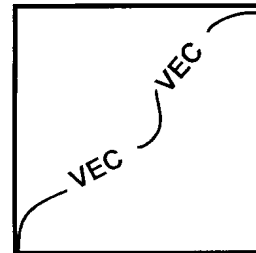
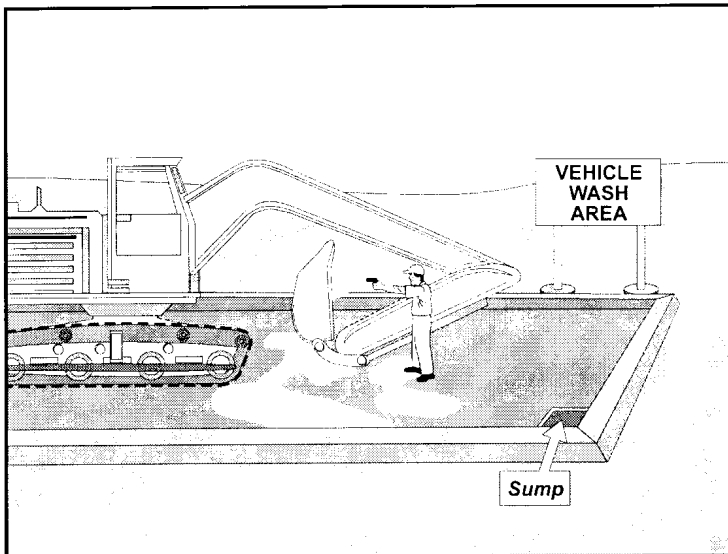
- Remove sediment from basin when the volume of the basin has been reduced by one-half.

• • Type 3 - Sandbag Barrier

- Inspect bags for holes, gashes, and snags.
- Check sandbags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.

Vehicle and Equipment Cleaning

NS-8



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to storm drain system or to watercourses.

Appropriate Applications These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

Limitations None.

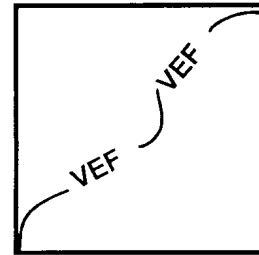
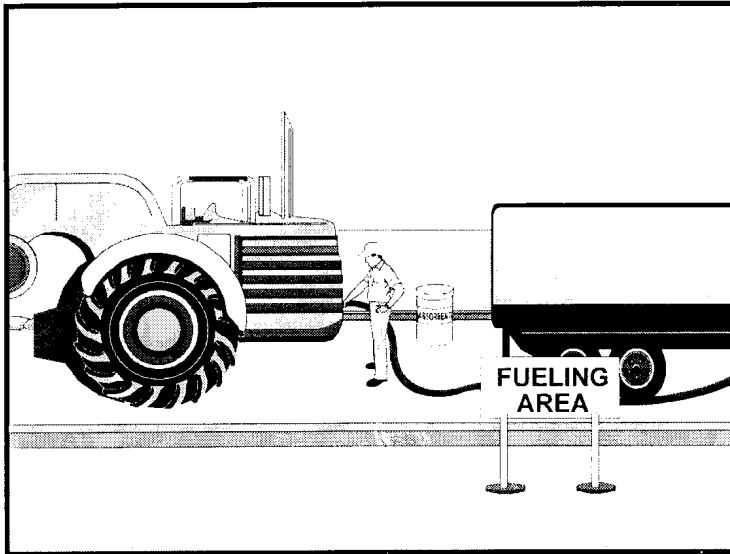
- Standards and Specifications**
- On-site vehicle and equipment washing is discouraged.
 - Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the project site unless the Resident Engineer (RE) has been notified in advance and the resulting wastes are fully contained and disposed of outside the highway right-of-way in conformance with the provisions in Section 7-1.13 of the Standard Specifications. Resulting wastes shall not be discharged or buried within the highway right-of-way.
 - Vehicle and equipment wash water shall be contained for percolation or evaporative drying away from storm drain inlets or watercourses and shall not be discharged within the highway right-of-way.
 - All vehicles/equipment that regularly enter and leave the construction site must be cleaned off-site.
 - When vehicle/equipment washing/cleaning must occur on-site, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area shall have the



following characteristics, and shall be arranged with the construction storm water coordinator:

- Located away from storm drain inlets, drainage facilities, or watercourses
 - Paved with concrete or asphalt and bermed to contain wash waters and to prevent run-on and runoff
 - Configured with a sump to allow collection and disposal of wash water
 - Wash waters shall not be discharged to storm drains or watercourses
 - Used only when necessary
- • When cleaning vehicles/equipment with water:
 - Use as little water as possible. High pressure sprayers may use less water than a hose, and shall be considered.
 - Use positive shutoff valve to minimize water usage.
 - • The control measure shall be inspected at a minimum of once a week.
 - • Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
 - • Inspect sump regularly and remove liquids and sediment as needed or as directed by the RE.

Maintenance and Inspection



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices to minimize or eliminate the discharge of fuel spills and leaks into the storm drain system or to watercourses.

Appropriate Applications These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

Limitations

- On-site vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

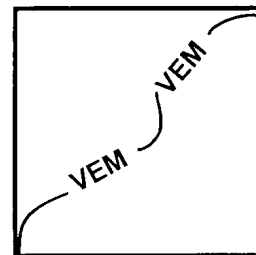
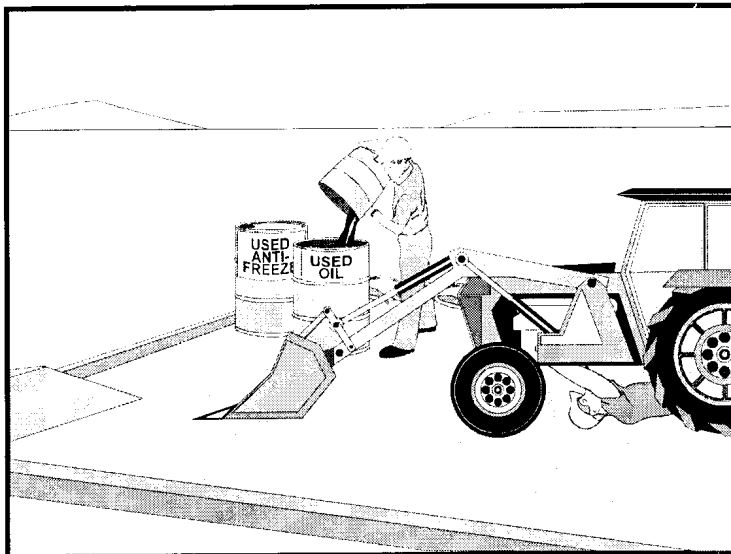
Standards and Specifications

- When fueling must occur on-site, the contractor shall select and designate an area to be used, subject to approval of the Resident Engineer (RE).
- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Dedicated fueling areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended.

- • Protect fueling areas with berms and/or dikes to prevent run-on, runoff, and to contain spills.
- • Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- • Fuel tanks shall not be "topped-off."
- • Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- • Absorbent materials shall be used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
- • Federal, state, and local requirements shall be observed for any stationary above ground storage tanks.
- • Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.

Maintenance and Inspection

- • Fueling areas and storage tanks shall be inspected on a regular basis.
- • Keep an ample supply of spill cleanup material on the site.
- • Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain system or to watercourses from vehicle and equipment maintenance procedures.

Appropriate Applications These procedures are applied on all construction projects where an on-site yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations None identified.

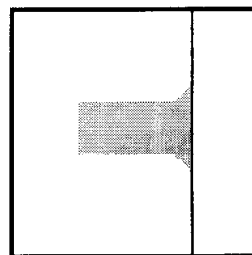
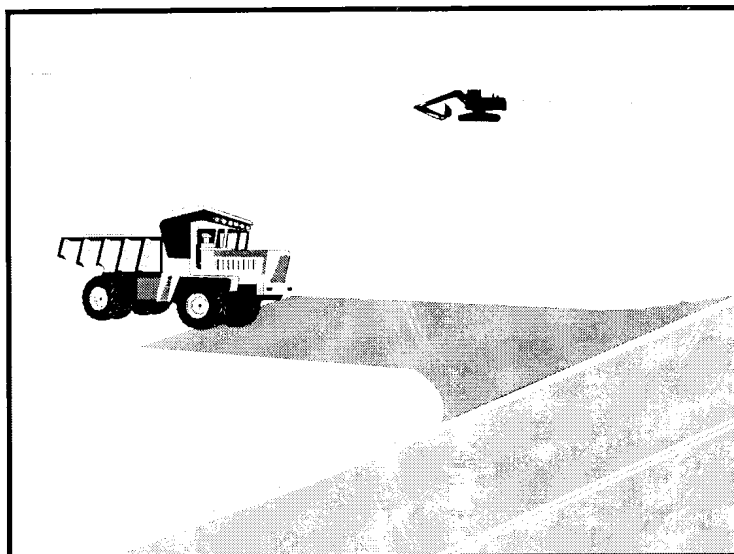
- Standards and Specifications**
- • Drip pans or absorbent pads shall be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
 - • All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
 - • Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m from downstream drainage facilities and watercourses.
 - • Drip Pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
 - • Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use. Substances used to coat asphalt transport trucks and asphalt spreading equipment shall be non-toxic. Drainage inlet structures and manholes shall be covered with filter fabric

when seal coat, tack coat, slurry seal, or fog seal is applied to adjacent surfaces. Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall or thunderstorms are predicted to occur during the application or curing period.

- • Use off-site maintenance facilities whenever practical.
- • For long-term projects, consider using portable tents or covers over maintenance areas.
- • Properly dispose of used oils, fluids, lubricants and spill cleanup materials.
- • Do not dump fuels and lubricants onto the ground.
- • Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- • Properly dispose of or recycle used batteries.
- • Do not bury used tires.
- • Repair leaks of fluids and oil immediately.
- • Provide spill containment dikes or secondary containment around stored oil and chemical drums.

Maintenance and Inspection

- • Maintain waste fluid containers in leak proof condition.
- • Vehicle and equipment maintenance areas shall be inspected regularly.
- • Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicle(s) or equipment shall be removed from the project site.
- • Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A stabilized construction access is a defined point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Appropriate Applications

- • Use at construction sites:
 - where dirt or mud is tracked onto public roads
 - adjacent to water bodies
 - where poor soils are encountered
 - where dust is a problem during dry weather conditions.
- • This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Resident Engineer (RE).

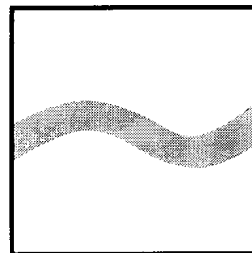
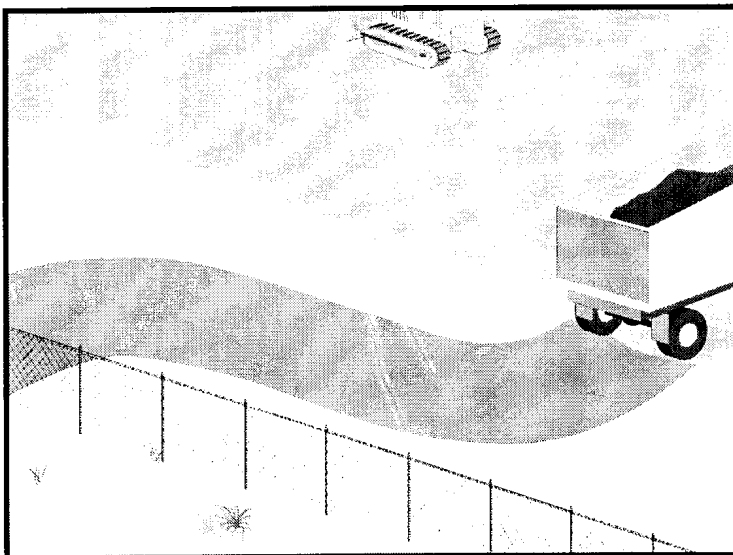
Limitations

- • Site conditions will dictate design and need.

Standards and Specifications

- • Limit the points of entrance/exit to the construction site.
- • Limit speed of vehicles to control dust.
- • Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- • Route runoff from stabilized entrances/exits through a sediment-trapping device before discharge.

- • Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
 - • Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. The use of asphalt concrete (AC) grindings for stabilized construction access/roadway is not allowed.
 - • Use of constructed or constructed/manufactured steel plates with ribs for entrance/exit access is allowed with written approval of the RE.
 - • If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 75 mm (3 inches) but smaller than 150 mm (6 inches) shall be used.
 - • Designate combination or single purpose entrances and exits to the construction site. Require all employees, subcontractors and others to use them.
 - • Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Maintenance and Inspection
- • Inspect routinely for damage and assess effectiveness of the BMP. Repair if access is clogged with sediment or as directed by the RE.
 - • Keep all temporary roadway ditches clear.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose A stabilized construction roadway is a temporary access road connecting existing public roads to a remote construction area. It is designed for the control of dust and erosion created by vehicular tracking.

Appropriate Applications

- • Construction roadways and short-term detour roads:
 - Where mud tracking is a problem during wet weather
 - Where dust is a problem during dry weather
 - Adjacent to water bodies
 - Where poor soils are encountered
- • This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

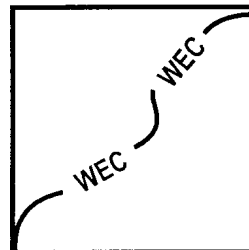
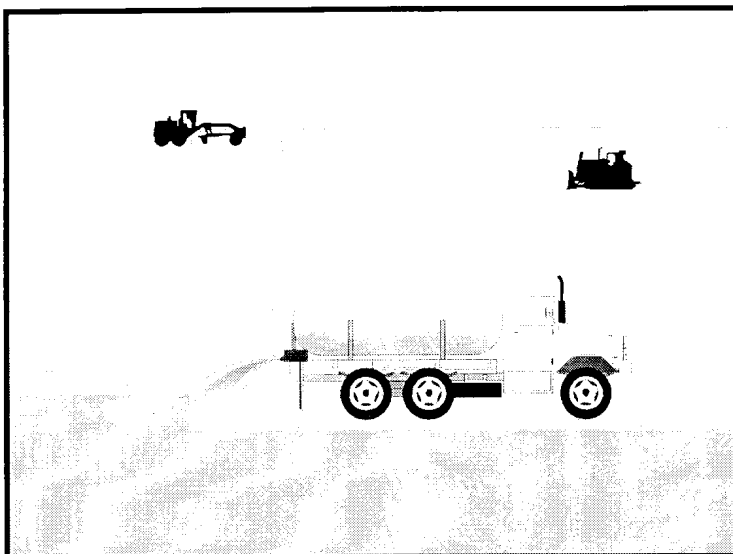
- • Materials will likely need to be removed prior to final project grading and stabilization.
- • Site conditions will dictate design and need.
- • May not be applicable to very short duration projects.
- • Limit speed of vehicles to control dust.

Standards and Specifications

- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.
- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 300 mm (12 in) depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 75 mm (3 inches) but smaller than 150 mm (6 inches) shall be used.

Maintenance and Inspection

- Inspect routinely for damage and repair as needed, or as directed by the Resident Engineer (RE).
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Wind erosion control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance. Dust control shall be applied in accordance with Caltrans standard practices. Covering of small stockpiles or areas is an alternative to applying water or other dust palliatives.

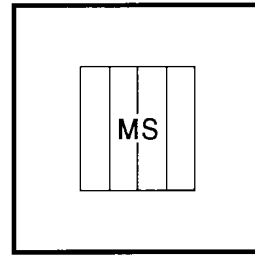
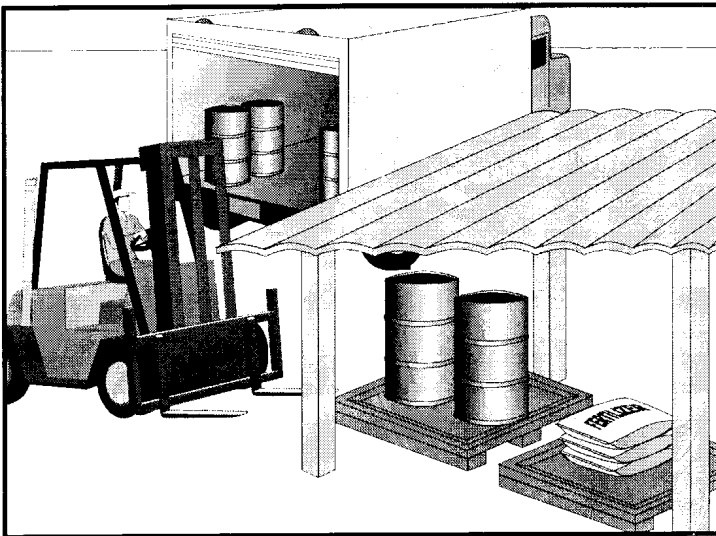
Appropriate Applications This practice is implemented on all exposed soils subject to wind erosion.

Limitations Effectiveness depends on soil, temperature, humidity and wind velocity.

- Standards and Specifications**
- • Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
 - • All distribution equipment shall be equipped with a positive means of shutoff.
 - • Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
 - • If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances shall be marked "NON-POTABLE WATER - DO NOT DRINK."
 - • Materials applied as temporary soil stabilizers and soil binders will also provide wind erosion control benefits.

Maintenance and Inspection

- • Check areas protected to ensure coverage.
- • Implement requirements of Section 10 of the Caltrans Standard Specifications as appropriate.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications These procedures are implemented at all construction sites with delivery and storage of the following:

- • Soil
 - • Pesticides and herbicides
 - • Fertilizers
 - • Detergents
 - • Plaster
 - • Petroleum products such as fuel, oil, and grease
 - • Asphalt and concrete components
 - • Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
 - • Concrete compounds
 - • Other materials that may be detrimental if released to the environment
- Limitations**
- • Space limitation may preclude indoor storage.
 - • Storage sheds must meet building & fire code requirements.

Standards and Specifications *General*

- • Train employees and subcontractors on the proper material delivery and storage practices.
- • Temporary storage area shall be located away from vehicular traffic.
- • Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials stored.

Material Storage Areas and Practices

Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be handled in conformance with the following provisions:

- • Storage, preparation, and mixing shall be accomplished in temporary containment facilities. Each temporary containment facility shall provide a spill containment volume equal to 1.5 times the volume of all containers therein and shall be impervious to the materials contained therein for a minimum contact time of 72 hours.
- • Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- • Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- • To provide protection from wind and rain, throughout the rainy season, temporary containment facilities shall be covered during non-working days and prior to rain events.
- • Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
- • Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- • Liquid materials, petroleum products, and substances listed in 40 CFR Parts 110, 117 or 302 shall be stored in approved containers and drums shall not be overfilled. Containers shall be placed in temporary containment facilities for storage.
- • Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.

- Stockpiles shall be protected in accordance with BMP WM-3, “Stockpile Management”.
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Store materials indoors within existing structures or sheds when available.
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, under cover in secondary containment.
- Keep hazardous chemicals well labeled and in their original containers.
- Keep ample supply of appropriate spill clean up material near storage areas.
- Also see BMP WM-6, “Hazardous Waste Management”, for storing of hazardous materials.

Material Delivery Practices

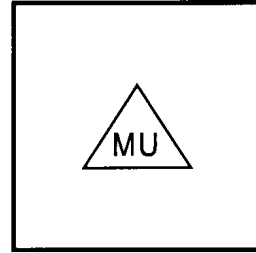
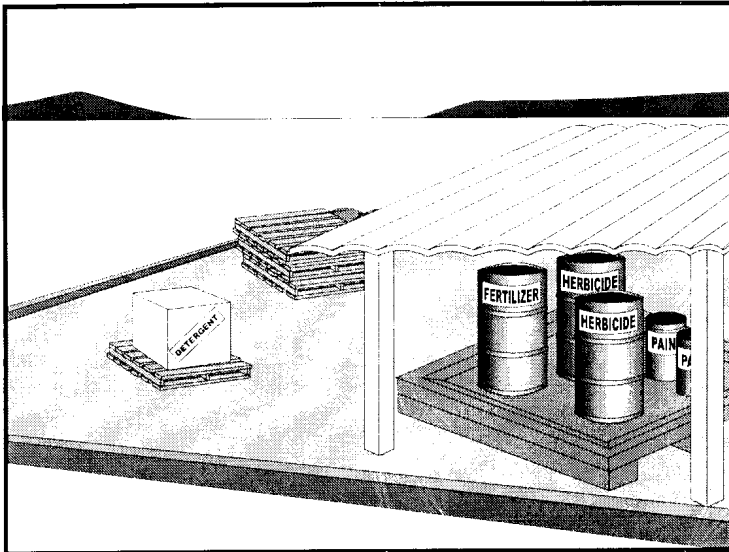
- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Clean-up

- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.
- See BMP WM-4, “Spill Prevention and Control”, for spills of chemicals and/or hazardous materials.

Maintenance and Inspection

- Storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Inspect storage areas before and after rainfall events, and at least weekly during other times.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- • Pesticides and herbicides
- • Fertilizers
- • Detergents
- • Plaster
- • Petroleum products such as fuel, oil, and grease
- • Asphalt and other concrete components
- • Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- • Concrete compounds
- • Other materials that may be detrimental if released to the environment

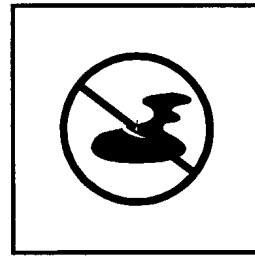
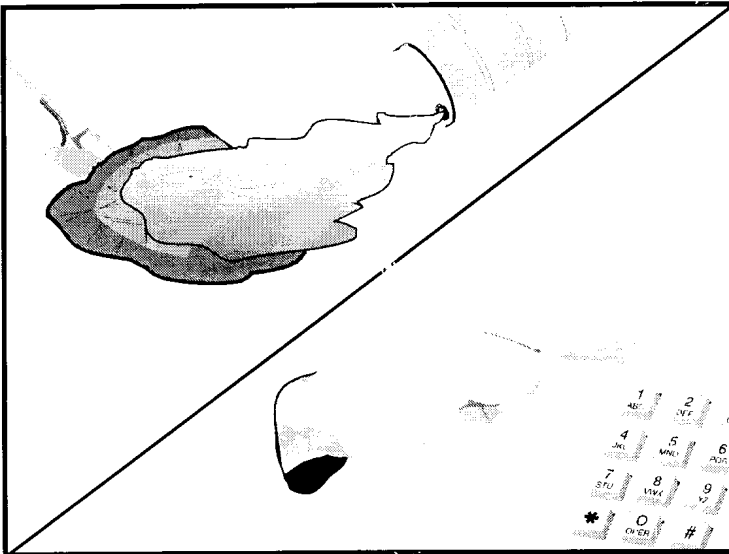
Limitations • • Safer alternative building and construction products may not be available or suitable in every instance.

Standards and Specifications

- • Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials.
- • Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- • Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
- • Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
- • For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- • Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- • Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
- • Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
- • Application of herbicides and pesticides shall be performed by a licensed applicator.
- • Contractors are required to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- • Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- • Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Maintenance and Inspections

- • Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

Appropriate Application This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- • Soil stabilizers/binders
- • Dust Palliatives
- • Herbicides
- • Growth inhibitors
- • Fertilizers
- • Deicing/anti-icing chemicals
- • Fuels
- • Lubricants
- • Other petroleum distillates

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately.

- | | |
|-------------------------------------|--|
| Limitations | <ul style="list-style-type: none">• • This BMP only applies to spills caused by the contractor.• • Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site. |
| Standards and Specifications | <ul style="list-style-type: none">• • To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water run-on during rainfall.• • Spills shall not be buried or washed with water.• • Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with the provisions in these special provisions.• • Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP WM-10, "Liquid Waste Management".• • Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.• • Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.• • Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function. |

Education

- • Educate employees and subcontractors on what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- • Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- • Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- • Establish a continuing education program to indoctrinate new employees.

- • The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper spill prevention and control measures.

Clean up and Storage Procedures

- • Minor Spills
 - Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
 - Use absorbent materials on small spills rather than hosing down or burying the spill.
 - Remove the absorbent materials promptly and dispose of properly.
 - The practice commonly followed for a minor spill is:
 1. Contain the spread of the spill.
 2. Recover spilled materials.
 3. Clean the contaminated area and/or properly dispose of contaminated materials.
- • Semi-Significant Spills
 - Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
 - Clean up spills immediately:
 1. Notify the project foreman immediately. The foreman shall notify the Resident Engineer (RE).
 2. Contain spread of the spill.
 3. If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 4. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 5. If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

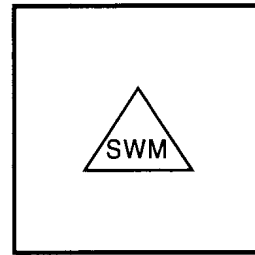
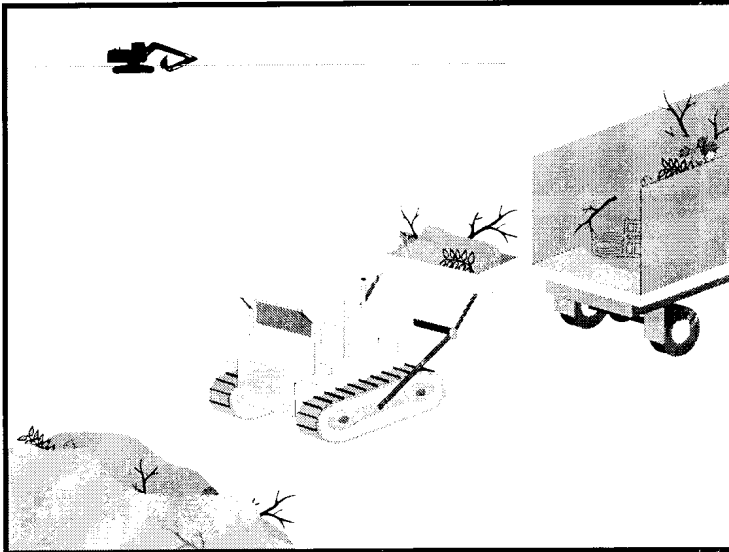
- • Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:

1. Notify the RE immediately and follow up with a written report.
2. Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
3. Notify the Governor's Office of Emergency Services Warning Center, (805) 852-7550.
4. For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
5. Notification shall first be made by telephone and followed up with a written report.
6. The services of a spill contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up until the appropriate and qualified staff have arrived at the job site.
7. Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Maintenance and Inspection

- • Verify weekly that spill control clean up materials are located near material storage, unloading, and use areas.
- • Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals on site.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices to minimize or eliminate the discharge of pollutants to the drainage system or to watercourses as a result of the creation, stockpiling, and removal of construction site wastes.

Appropriate Applications Solid waste management practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.
- Highway planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

Limitations Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Standards and Specifications *Education*

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper solid waste procedures and practices.

- • Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- • Educate employees and subcontractors on solid waste storage and disposal procedures.
- • Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- • Require that employees and subcontractors follow solid waste handling and storage procedures.
- • Prohibit littering by employees, subcontractors, and visitors.
- • Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

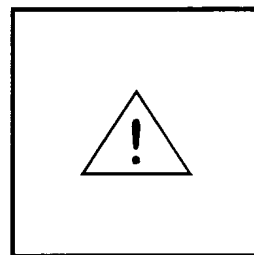
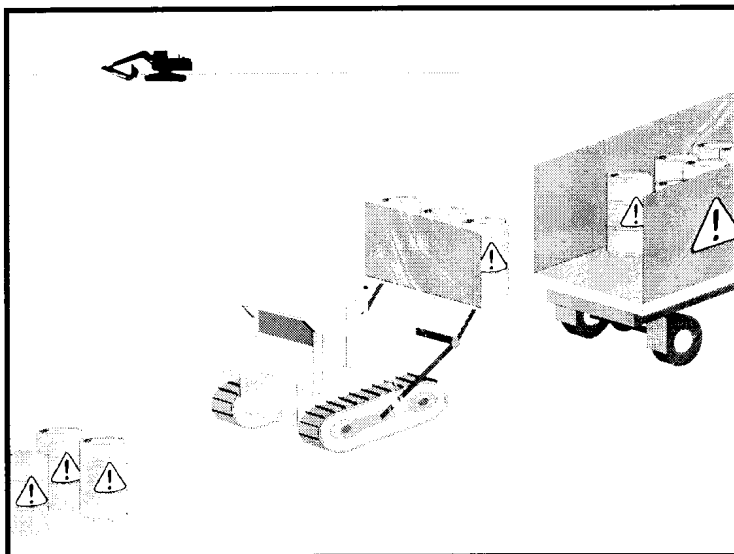
- • Littering on the project site shall be prohibited.
- • To prevent clogging of the storm drainage system litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- • Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- • Litter from work areas within the construction limits of the project site shall be collected and placed in water tight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
- • Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project.
- • Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.
- • Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.
- • Materials that are disposed of or temporarily stockpiled outside the highway right-of-way but are visible from the Highway, shall be in a neat and orderly fashion to the satisfaction of the Resident Engineer (RE).
- • Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or

through the use of measures to elevate waste from site surfaces.

- • Solid waste storage areas shall be located at least 15m from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- • Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be protected from wind and rain by securely covering the waste with tarps or plastic sheeting or protected in conformance with the applicable Disturbed Soil Area protection.
- • Dumpster washout on the project site is not allowed.
- • Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
- • Plan for additional containers during the demolition phase of construction.
- • Plan for more frequent pickup during the demolition phase of construction.
- • Designate on-site waste storage areas and obtain approval of the RE.
- • Segregate potentially hazardous waste from non-hazardous construction site waste.
- • Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- • Dispose of non-hazardous waste in accordance with Standard Specification 7-1.13, Disposal of Material Outside the Highway right-of-way.
- • For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management". Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- • Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Maintenance and Inspection

- • The WPCM shall monitor on-site solid waste storage and disposal procedures.
- • Police site for litter and debris.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain system or to watercourses.

- Appropriate Applications**
- This best management practice (BMP) applies to all construction projects.
 - Hazardous waste management practices are implemented on construction projects that generate waste from the use of:
 - Petroleum Products,
 - Concrete Curing Compounds,
 - Palliatives,
 - Septic Wastes,
 - Stains,
 - Wood Preservatives,
 - Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.
 - Asphalt Products,
 - Pesticides,
 - Acids,
 - Paints,
 - Solvents,
 - Roofing Tar, or

- Limitations**
- Nothing in this BMP relieves the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
 - This BMP does not cover aerally deposited lead (ADL) soils. For ADL soils refer to BMP WM-7, Contaminated Soil Management, and the project Special Provisions.

Standards and Specifications *Education*

- • Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- • Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- • Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- • Instruct employees and subcontractors in identification of hazardous and solid waste.
- • Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- • The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper hazardous waste management procedures and practices.
- • Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Storage Procedures

- • Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- • All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- • Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
 - Temporary containment facility shall provide a spill containment volume equal to 1.5 times the volume of all containers.
 - Temporary containment facility shall be impervious to the materials contained for a minimum contact time of 72 hours.
 - Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
 - Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
 - Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

- • Throughout the rainy season, temporary containment facilities shall be covered during non-working days, prior to rain events.
- • Drums shall not be overfilled and wastes shall not be mixed.
- • Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.
- • Ensure that adequate hazardous waste storage volume is available.
- • Ensure that hazardous waste collection containers are conveniently located.
- • Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
- • Minimize production or generation of hazardous materials and hazardous waste on the job site.
- • Use containment berms in fueling and maintenance areas and where the potential for spills is high.
- • Segregate potentially hazardous waste from non-hazardous construction site debris.
- • Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- • Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- • Place hazardous waste containers in secondary containment.
- • Do not allow potentially hazardous waste materials to accumulate on the ground.
- • Unless watertight, containers of dry waste shall be stored on pallets.
- • Do not mix wastes.

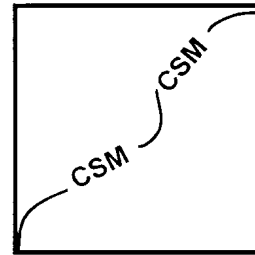
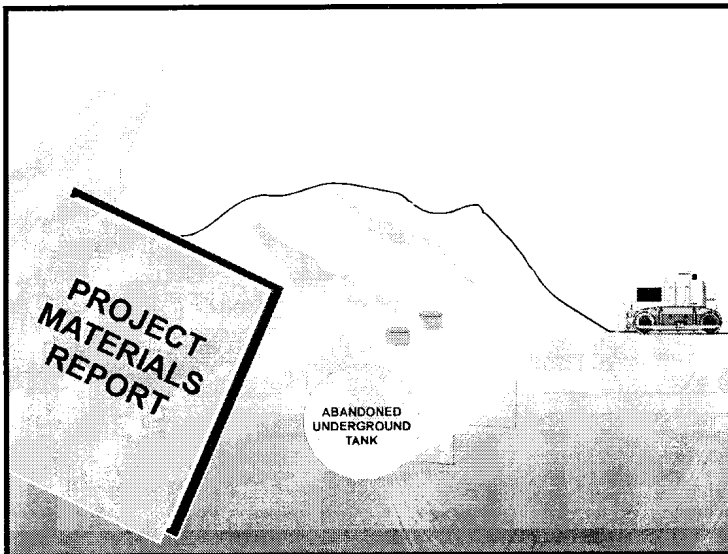
Disposal Procedures

- • Waste shall be disposed of outside the highway right-of-way within 90 days of being generated, or as directed by the Resident Engineer (RE).
- • To minimize on-site storage, full containers of waste shall be disposed of outside the highway right-of-way at least weekly. In no case shall hazardous waste storage exceed requirements in Title 22 CCR, section 66262.34.
- • Waste shall be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Waste Manifest forms. In no case shall hazardous waste storage exceed requirements in Title 22 CCR, section 66262.34.
- • A Caltrans certified laboratory shall sample waste to determine the appropriate disposal facility.
- • Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for solid waste construction debris.
- • Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- • Recycle any useful material such as used oil or water-based paint when practical.
- • Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Maintenance and Inspection

- • The WPCM shall monitor on-site hazardous waste storage and disposal procedures.
- • Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- • Storage areas shall be inspected in conformance with the provisions in the contract documents.
- • Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- • Hazardous spills shall be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- • The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
- • Copy of Bill of Lading and disposal receipts shall be provided to the RE.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose	These are procedures and practices to minimize or eliminate the discharges of pollutants to the drainage system or to watercourses from contaminated soil.
Appropriate Applications	<ul style="list-style-type: none">• Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, and leaks from underground storage tanks.• It may also apply to highway widening projects in older areas where median and shoulder soils may have been contaminated by aerially deposited lead (ADL).
Limitations	<ul style="list-style-type: none">• The procedures and practices presented in this best management practice (BMP) are general. The contractor shall identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.
Standards and Specifications	<p>Identifying Contaminated Areas</p> <ul style="list-style-type: none">• Contaminated soils are often identified during project planning and development with known locations identified in the plans and specifications. The contractor shall review applicable reports and investigate appropriate call-outs in the plans and specifications.• The contractor may further identify contaminated soils by investigating:<ul style="list-style-type: none">- Past site uses and activities.- Detected or undetected spills and leaks.

- Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris. Test suspected soils at a certified laboratory.

Education

- • Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified.
- • Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- • Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- • Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- • Excavation, transportation, and placement operations shall result in no visible dust.
- • Use caution to prevent spillage of lead containing material during transport.
- • Monitor the air quality during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- • Test suspected soils at a Caltrans approved certified laboratory.
- • If the soil is contaminated, work with the local regulatory agencies to develop options for treatment and/or disposal.
- • Avoid temporary stockpiling of contaminated soils or hazardous material.
- • If temporary stockpiling is necessary:
 - (1) Cover the stockpile with plastic sheeting or tarps.
 - (2) Install a berm around the stockpile to prevent runoff from leaving the area.

- (3) Do not stockpile in or near storm drains or watercourses.
- • Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.
 - • Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
 - • Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
 - • Collect water from decontamination procedures and treat and/or dispose of it at an appropriate disposal site.
 - • Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
 - • Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
 - • Excavation, transport, and disposal of contaminated material and hazardous material shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
 - United States Department of Transportation (USDOT);
 - United States Environmental Protection Agency (USEPA);
 - California Environmental Protection Agency (CAL-EPA);
 - California Division of Occupation Safety and Health Administration (CAL-OSHA); and
 - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- • Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies which have jurisdiction over such work.
- • Arrange to have tested, as directed by the Resident Engineer (RE), any liquid or sludge found in the underground tank prior to its removal to determine if it contains hazardous substances.

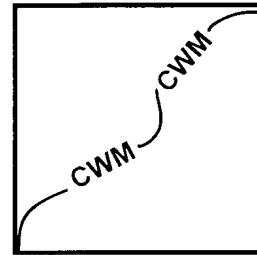
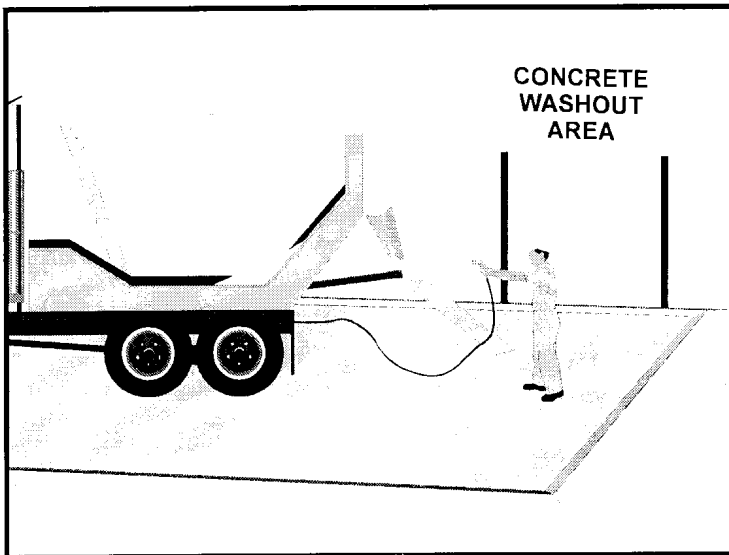
- • Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- • The underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities permitted to accept such waste.

Water Control

- • Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- • If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be discharged to clean, closed top, watertight holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Maintenance and Inspection

- • The Contractor's Water Pollution Control Manager and/or construction supervisor shall monitor on-site contaminated soil storage and disposal procedures.
- • Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- • Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.
- • Inspect hazardous waste receptacles and areas regularly.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose These are procedures and practices that are implemented to minimize or eliminate the discharge of concrete waste materials to the storm drain system or to watercourses.

- Appropriate Applications**
- Concrete waste management practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
 - Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
 - Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Resident Engineer (RE). See also NS-8, Vehicle and Equipment Cleaning.
 - Where mortar-mixing stations exist.

Limitations None identified.

- Standards and Specifications**
- Education**
- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
 - The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce concrete waste management procedures.

Concrete Slurry Wastes

- • PCC and AC waste shall not be allowed to enter storm drains or watercourses.
- • PCC and AC waste shall be collected and disposed of outside the highway right-of-way in conformance with section 7-1.13 of Standard Specifications or placed in a temporary concrete washout facility.
- • Disposal of hardened PCC and AC waste shall be in conformance with Section 15-3.02 of the Standard Specifications.
- • A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.
- • Below grade concrete washout facilities are typical. Above grade facilities are used if excavation is not practical.
- • Do not allow slurry residue from wet coring or saw-cutting AC or PCC to enter storm drains or receiving waters by:
 - Placing temporary berms or sandbags around coring or saw-cutting locations to capture and contain slurry runoff.
 - Placing straw bales, sandbags, or gravel dams around inlets to prevent slurry from entering storm drains.
- • Vacuum slurry residue and dispose in a temporary pit (as described in *On-Site Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures*, below) and allow slurry to dry. Dispose of dry slurry residue in accordance with BMP WM-5, "Solid Waste Management", or, for on-site disposal, in accordance with Standard Specification 15-3.02, Removal Methods.
- • Collect residue from grooving and grinding operations in accordance with Standard Specifications Section 42-1.02 and 42-2.02, "Construction."

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- • Temporary concrete washout facilities shall be located a minimum of 15 m (50 ft) from storm drain inlets, open drainage facilities, and watercourses, unless determined unfeasible by the RE. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- • A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be

installed as shown on the plans and in conformance with the provisions in Section 56-2, "Roadside Signs", of the Standard Specifications.

- • Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- • Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- • Perform washout of concrete trucks in designated areas only.
- • Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per BMP WM-5, "Solid Waste Management", and in conformance with the provisions in Section 15-3.02, "Removal Methods", of the Standard Specifications. Dispose of hardened concrete on a regular basis.
- • ***Temporary Concrete Washout Facility (Type Above Grade)***
 - Temporary concrete washout facility (type above grade) shall be constructed as shown on the plans, with a recommended minimum length and minimum width of 3m, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE.
 - Straw bales, wood stakes, and sandbag materials shall conform to the provisions in BMP SC-9, "Straw Bale Barrier".
 - Plastic lining material shall be a minimum of 60 mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
 - Portable delineators shall conform to the provisions in Section 12-3.04, "Portable Delineators", of the Standard Specifications. The delineator bases shall be cemented to the pavement in the same manner as provided for cementing pavement markers to pavement in Section 85-1.06, "Placement", of the Standard Specifications. Portable delineators shall be applied only to a clean, dry surface.
- • ***Temporary Concrete Washout Facility (Type Below Grade)***
 - Temporary concrete washout facility (type below grade) shall be constructed as shown on the plans, with a recommended minimum

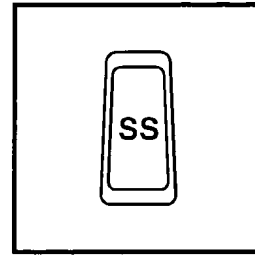
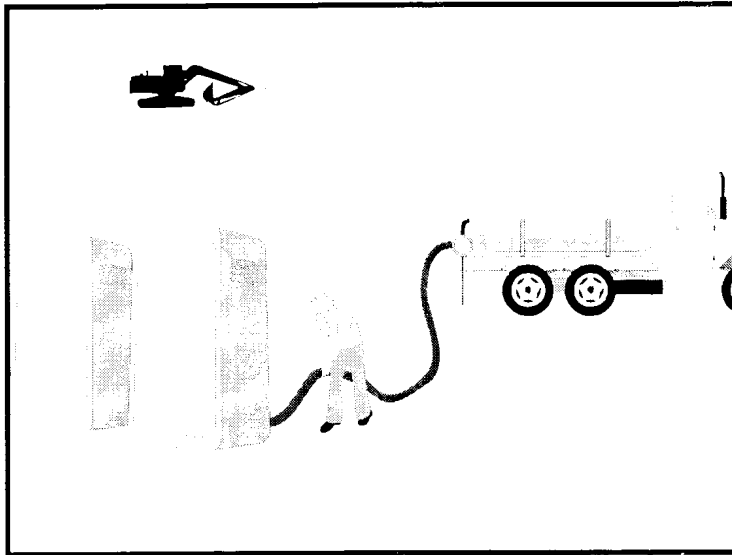
length and minimum width of 3m (10 ft). The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE. Lath and flagging shall be commercial type.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, as determined by the RE, the hardened concrete shall be removed and disposed of in conformance with the provisions in Section 15-3.02 of the Standard Specifications. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right-of-way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site concrete waste storage and disposal procedures at least weekly.
- The WPCM shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving at least weekly to ensure proper methods are employed.
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100mm for above grade facilities and 300mm for below grade facilities. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications.
- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.



BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose Procedures and practices to minimize or eliminate the discharge of construction site sanitary/septic waste materials to the storm drain system or to watercourses.

Appropriate Applications Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary/septic waste systems.

Limitations Not applicable.

Standards and Specifications

Education

- • Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.
- • Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- • Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- • Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- • Establish a continuing education program to indoctrinate new employees.

Storage and Disposal Procedures

- • Temporary sanitary facilities shall be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, as determined by the Resident Engineer (RE), temporary

sanitary facilities shall be secured to prevent overturning.

- • Wastewater shall not be discharged or buried within the highway right-of-way.
- • Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- • If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- • Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- • Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- • Use only reputable, licensed sanitary/septic waste haulers.
- • The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site sanitary/septic waste storage and disposal procedures at least weekly.

Maintenance and Inspection